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TOMATO SPOTTED WILT VIRUS IN ORNAMENTALS

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In 1988 tomato spotted wilt virus (TSWV) was detected in Florida on gloxinia, Sinningia speciosa (Lodd.) Hiern. This was the first report of TSWV infecting a greenhouse crop in Florida. TSWV was first reported in Florida on field grown gladiolus in South Florida in 1985 (4); however, in that episode the virus did not spread from the fields where it was detected. Since 1986 TSWV has been reported in North Florida on field-grown tomatoes, peanuts, tobacco and peppers (5, R. K. Sprenkel personal communication). Florida greenhouse growers are concerned with TSWV because of its wide host range (Table 1), unusual vector (thrips) and the potential for its movement in the industry.

SYMPTOMS: Many symptoms have been attributed to TSWV infection (1). TSWV infection in plants under six weeks of age will often produce severe foliar necrosis, plant decline, and death. Symptoms in older plants include: leaf distortion; mottling of leaves; vein clearing; as well as wavy lines and/or concentric rings on foliage, flowers, and petioles. Additional symptoms include plant stunting, purplish-brown sunken leaf lesions, external brown stem streaking, and flower color break. Some symptoms, like basal stem rotting, are atypical for a virus infection. Symptom expression is also influenced by environment, plant nutrition, and physiological plant age (3). Diagnosis of TSWV infection based on symptoms is difficult since other biotic agents (e.g. fungi) as well as abiotic factors may mimic TSWV symptoms. However, as an aide to practitioners the following descriptions of TSWV symptoms in figures 1-5 are given for some greenhouse ornamentals important to Florida greenhouse growers.

Fig. 1. Foliar symptoms of TSWV on gloxinia (Sinningia speciosa) - A. Terminal bud necrosis, stunting, basal rot, and plant collapse are evident which appears to look like root rot symptoms. Leaves are malformed with necrotic line patterns and ringspots. B. Flowers have concentric ringspots, color break, distortion, and flowering is delayed. Photos courtesy of J. A. Matteoni and R. K. Jones.

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Fig. 2. New Guinea Impatiens (Impatiens sp.) infected with TSWV. Papery, necrotic areas, including the leaf midrib, browning, and ringspots appear on leaves. Spots may develop on only one side of the leaf and ringspots occasionally are present. Leaf drop is a common symptom. As the virus becomes systemic, faint purplish ring patterns develop on newer leaves. Some cultivars may die while others exhibit uneven growth that reduces their value. Photo courtesy of J. A. Matteoni.

Fig. 3. Chrysanthemum (C. maximum Ramond) infected with TSWV. Stem lesions, extending down and around the stems, and leaf necrosis are followed by dieback of plants. Chlorotic ring symptoms may be evident on the foliage during the early stages of infection. Following a period of stress, flowering plants have a blighted appearance similar to those associated with Fusarium wilt. Photo courtesy of J. A. Matteoni.

Fig. 4. Cineraria (Senecio cruentus [Masson] DC.) infected with TSWV show chlorotic ringspots, rugosity, and curling of leaves. Necrotic areas on petioles and stems may enlarge and constrict the affected tissues. At bloom, leaves are wilted, rolled, and yellowed. Photo courtesy of J. A. Matteoni

Fig. 5. Zebra Plants (Aphelandra squarrosa Nees) infected with TSWV develop dark necrotic areas along the midrib and lateral veins of leaves followed by leaf distortion and death. Since these symptoms are similar to those caused by Phytophthora stem rot, diagnosis requires that plants with roots and soil be submitted for analysis. Photo courtesy of L. W. Barnes.

CAUSAL AGENT: Tomato spotted wilt virus is the sole member of a RNA-containing virus group that has membrane bound isometric particles 70-90 nm in diameter (3). Four thrips species that transmit TSWV are known to occur in Florida: western flower thrips, Frankliniella occidentalis (Pergande); tobacco thrips, F. fusca (Hinds); onion thrips, F. tabaci Linderman; and F. schultzei Trybom. Thrips setosus Moulton and Scirtothrips dorsalis Hood also transmit TSWV but are not found in Florida.

Only thrips larvae acquire the virus; therefore, only thrips that feed on infected plants in the larval stage can transmit the virus. There is no confirmed evidence that TSWV is seed transmitted (2).

CONTROL: TSWV is difficult to control when there is a source of the virus, many susceptible hosts, and an abundance of thrips vectors. This means that prevention, early detection, and quick action are needed to reduce losses. Control of this virus is based on eliminating all sources of the virus in and around greenhouses. All infected plants must be destroyed because once a plant becomes infected it remains a source of the virus even if symptoms disappear. Thrips control with insecticides will be more effective if screening is used to reduce migration of infected thrips into the greenhouse. These migrating thrips can infect plants before the pesticide residue has time to kill them. Consult the IFAS Insect Control Guide for recommended pesticides. Eliminating susceptible weeds inside the greenhouse and controlling them around the greenhouse can be beneficial.

SURVEY AND DETECTION: Look for stunted plants, terminal bud necrosis, and leaves with chlorotic or necrotic ringspots and line patterns. Infected leaves are distorted and have vein and petiole necrosis. Stem necrosis is also common. Flowers have rings and line patterns, color breaking, distortion and delayed opening. Infected plants younger than six weeks show severe foliar necrosis, plant decline, and mortality. Survey susceptible plants for western flower thrips and other thrips vectors of TSWV by dissecting flowers or by shaking the plant over a white piece of paper or drop cloth.

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Table 1. Common Ornamental Hosts of Tomato Spotted Wilt Virus[1]

Amaryllis	Columbine	Gladiolus[2]	Phlox
Anemone	Cosmos	Gloxinia[2]	Poppy
Aster	Cyclamen	Gypsophila	Primula
Begonia	Dahlia	Impatiens	Ranunculus
Calceolaria	Delphinium	Lobelia	Salvia
Calendula	Dusty Miller	Marigold	Snapdragon
Calla Lily	Evening Primrose	Morning Glory	Stock
China Aster	Forget-Me-Not	Nasturtium	Tiger Lily
Chrysanthemum	Geranium	Peony	Verbena
Cineraria	Gerber Daisy	Petunia	Zinnia

[1]The host range for TSWV is broader than this selected listing.

[2]TSWV confirmed on this host in Florida.

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